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## STATISTICS OF THE WATER SUPPLIES OF THE PROVINCE OF QUEBEC<sup>1</sup>

BY THEO. J. LAFRENIÈRE<sup>2</sup>

The Province of Quebec has a population distributed as follows: 18 cities with 1,101,200, 81 towns with 178,400, 220 villages with 158,400, 887 rural municipalities with 942,000, making a total of 2,380,000. The population of the cities and towns is then 53.7 per cent of the total population, leaving 46.3 per cent as rural population.

There are 440 water supplies in the province, but half of them are small, serving only a few houses in some cases. According to the data available, 59 per cent of the population of the province is served by water-works, and 41 per cent use shallow or tubular wells.

A special study of the water supplies of cities, towns and villages with a population of over 500 inhabitants shows that there are 230 such municipalities, and 192 of them, with a combined population of 1,383,700, have water-works. It is interesting to note from table 1 how the various sources of supply have been utilized.

Of the total population served by water-works, 86 per cent is supplied with river water, a very high percentage. This is due to the fact that, with four exceptions, all the cities use river water. When the water-works were installed, some forty years ago, the rivers were fairly clean and the necessity of pure water was not as well understood as it is today. The towns were built on the shores of large rivers offering a water supply of good appearance, and consequently the rivers were used in preference to more distant sources of supply.

The lakes, on the other hand, have not been fully utilized, when it is considered that only 3.8 per cent of the population is supplied from such a source. The numerous lakes all over the province offer a first class supply; but unfortunately, these lakes are not near the large centers of population. Twenty water-works use lake water, but they serve mostly small towns.

<sup>1</sup> Read before the Montreal Convention, June 22, 1920. Discussion is invited and should be sent to the Editor.

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The water-bearing formations in the province are not well known; the available information on the subject is very meagre. Hence, only 10 per cent of the population is supplied with underground water. With few exceptions, the 75 water-works in this class use springs originating at the outcrop of a porous stratum underlaid by an impervious one. Such supplies are usually possible for small towns only. Several artesians wells have been sunk in the last few years, with remarkable success; the disadvantage of such a source of supply is that unless an extensive water-bearing formation is reached, the yield of the wells is uncertain and variable.

A great number of municipalities do not own their water supply, but with the exception of a part of the city of Montreal and two adjoining cities, this occurs in small towns and villages only. One municipality out of three does not own its water supply. The cost of water-works is high, and after their construction, the small town finds that most of its borrowing power has been used by the water-works and that practically nothing is left for other improvements. Consequently, in order to have both, the water-works and the necessary funds for other improvements, the municipality grants a franchise for the water-works, which is a revenue-producing utility. This practice is not to be encouraged, as in most cases the system does not provide for adequate fire protection, and eventually the municipality has to buy the system and practically build it new.

Since the creation of a provincial department of municipal affairs, the limit on borrowing power has been removed, but the necessary majority to sanction a by-law has been increased. Hence, it is hoped that the number of municipal water-works will increase.

If we examine the use made of the various sources of supplies by the municipal or private corporations, we find that in both cases, over 85 per cent of the population is supplied with river water. Only two private water-works use lake waters, while 40 small supplies are derived from springs and wells.

We have seen that 86 per cent of the population served by water-works is supplied with river water, which is usually unsafe for domestic use. However, all of this water is not consumed without previous treatment. In the province today, 858,000 people are supplied with filtered river water, and 170,000 with chlorinated water, giving a total 1,028,000 people using treated water. This number represents 86 per cent of the population using river water. Six municipalities, with a population of 60,000 people, now chlori-

nating their supply, have been ordered by the Superior Board of Health to install purification works.

Lake water and underground water being naturally good, it would seem that our water question is practically solved; unhappily, it is not so. The great percentage of the population is protected against water-borne diseases, but the remaining 14 per cent is divided among many small municipalities which will be harder to reach than the larger towns.

TABLE 1  
*Statistics of the water supplies in the Province of Quebec in towns of more than 500 inhabitants*

	RIVER WATER	LAKE WATER	SPRINGS, WELLS	TOTAL
<i>Municipal works</i>				
Number of works.....	71	18	35	124
Percentage of number.....	57.3	14.5	28.2	100
Population served.....	903,778	49,929	92,523	1,046,260
Percentage of population.....	86.4	4.8	8.8	100
<i>Private works</i>				
Number of works.....	26	2	40	68
Percentage of number.....	38.2	3.0	58.8	100
Population served.....	288,734	2,950	45,745	337,469
Percentage of population.....	85.5	0.9	13.6	100
<i>All works</i>				
Number of works.....	97	20	75	192
Percentage of number.....	50.5	10.4	39.1	100
Population served.....	1,192,512	52,879	138,338	1,383,729
Percentage of population.....	86.2	3.8	10	100
<i>Filtration practiced</i>				
Number of places.....	29			
Population served.....	860,000			
<i>Chlorination practiced</i>				
Number of places.....	15			
Population served.....	170,000			
<i>No treatment</i>				
Number of places.....	53			
Population served.....	163,000			

It appears from table 1 that 53 towns, with a combined population of 163,000 inhabitants, use river water without any previous treatment. The streams from which these supplies are derived are more or less contaminated. Moreover, approximately 20 per cent of the towns supplied by underground water have a supplementary water intake in a nearby stream, for fire purposes.

Now the Quebec Public Health Act of 1915 gives to the Superior Board of Health extensive powers concerning the control of water supplies. Plans for all new water-works must be approved by the Board before the works can be installed. Furthermore, the Board has the right to make investigations and to order purification works where needed, or to order the causes of pollution to be removed. When the supply is owned by a private corporation the Quebec Public Utilities Commission decides whether the cost of the improvements shall be paid by the private corporation or the municipality, and in what proportion. To comply with the orders of the Board, the municipal corporation is allowed to borrow the necessary amount without being obliged to submit the by-law to its ratepayers, and the Board has the right to have the improvements done at the expense of the municipality, when the latter refuses to submit to the order.

But even with these extensive powers, the improvements necessary to the water supplies of the small towns above mentioned may not easily be obtained, because of the excessive cost of materials and the high rate of interest charged for municipal loans. The difficulty thus reduces to the financial question of how to obtain money for these small towns at a reasonable interest rate.

This difficulty the Board of Health hopes to overcome by means of a project, now under consideration, whereby small municipalities may borrow from the Province, and at a low rate, the funds required for the needed improvements. If, as is expected, the legislature sanctions such a project, this most important remaining problem of water supplies in the Province of Quebec—the problem of the small town supply—may be susceptible of solution.

### *DISCUSSION*

JOHN N. CHESTER: This paper deserves commendation, for it shows that if the administrative officers of the Province of Quebec can enforce the powers explained by the author, the Province is certainly in a better position in these respects than many of the states of the United States. This is not only true of the safeguarding of the quality of the water supplies but also applies to the financial methods of meeting the cost of really necessary work. In the United States we have the Bense act, in Ohio, intended to accomplish many of the things which the Quebec law provides for. The Bense act as

first passed was overthrown in the courts. It was then re-enacted in a modified form to meet the court's objections to the first form, and its status in this amended shape has still to be passed upon by the courts. If the Quebec law has been tested in the courts, their rulings will be of interest.

PRESIDENT DAVIS: To those in responsible charge of water works the financial problems are often the most troublesome to meet, and for this reason it will be interesting to learn if there is any restriction on the debt limit of the Province of Quebec which limits in turn the aid the Province can give to small towns for the betterment of their water supplies.

R. O. WYNNE-ROBERTS: Under such broad powers as the Provincial Board of Health of Quebec possesses, the financial problems that arise in meeting its order are likely to be interesting. For example, if a private company supplies the water and the Board orders the water to be filtered, is the additional cost of filtering to be met by the company out of its rates for unfiltered water, or are the rates increased, or does the municipality pay the additional cost and raise the money through its tax levies? Questions like these come up with works established for some years, but in the case of new works is it possible in the Province of Quebec for a town to build works using a polluted source of supply and assume no responsibility for the purification of that water until the Provincial Board of Health orders its quality improved?

THEO. J. LAFRENIÈRE: Mr. Chester's inquiry about the rulings of the courts on the Quebec law can be answered only partially as yet. The water supply of one town, Hull, was condemned and the case taken into the courts. The trial court condemned the supply and the town has carried the case to the Court of Appeals. Two other towns have refused to comply with the orders of the Board of Health, apparently waiting for the Court of Appeals to pass on the test case. A fourth town which refused at first to carry out the Board's orders has since changed its mind. As the law now stands in the courts, the Provincial Board of Health does have the power to compel a city to improve the quality of an unsafe water supply, and it will continue to exercise that power until the courts decide against it.

President Davis' statement regarding the assistance given by the Province in financing improvements of small water supplies introduces a subject which first received general consideration here when the improvement of local roads became imperative. In 1908 the Provincial legislature inaugurated annual subsidies to local municipalities which would undertake the maintenance of these roads, previously left to the property owners. In the same year it also instituted special annual grants to the municipalities which had surfaced roads. In 1912 the legislature voted to borrow \$10,000,000, increased in 1915 to \$15,000,000 and to \$20,000,000 in 1916, for road purposes, part of which is loaned to towns to help them build gravel and macadam roads. The money was first loaned for 41 years at 2 per cent, less than the Province was paying for it; later the rate was increased to 3 per cent. These loans are made on the theory that the Province as a whole gains by the improvement of its minor subdivisions to such an extent that the use of a relatively small amount of public funds for supporting such local improvement is justifiable. The same principle is the basis of the United States laws allocating national funds to the several states to aid state road construction.

An investigation of the annual loss by typhoid fever in the Province was made some time ago, which showed the importance to the Province as a whole of improving the water supplies of the smaller communities. Our rivers are large and swift and it has not seemed necessary that sewage discharged into them should be purified. It is believed to be better sanitary policy, in view of all the local conditions, to purify the water supplies when necessary and to call upon the larger and wealthier cities to contribute toward the improvement of the water supplies of the small communities, just as they contribute to the improvement of local roads in rural districts. There is no legal limit to the funds that can be obtained in this way, as the decision rests wholly with the legislature. Similar laws are already in force in France and Italy.

In reply to the questions of Mr. Wynne-Roberts, it should be stated at the outset that the Provincial Board of Health had no authority until 1914 to order a private water company to improve its supply. Such authority as there was lay with the Public Utilities Commission, and a case arising under the law as it was prior to 1914 illustrates the conditions existing before that time. A water company was operating under a franchise which fixed the water rates

and provided that those rates could not be increased without the consent of the consumers. The supply deteriorated materially in quality through the pollution of the source, which the company could in no way prevent. The Public Utility Commission announced that it would order the company to improve the supply provided the consumers would agree to an increase in rates. A vote was taken and the proposed increase was defeated. The water supply, therefore, remained dangerous.

As a result of such conditions, the legislature amended the Public Health Act in 1919 so as to authorize the Public Utilities Commission to decide who is to blame for pollution of water supplies and to determine what additional compensation shall be paid to a water company for additional service which could not be anticipated when its franchise was granted. It is probable that the Commission will elect in at least some cases to allow the consumers to determine whether the additional cost of a pure supply shall be met by increased water rates or by an annual lump sum paid by the municipality.

Since 1901 it has been necessary for all new water supply projects, whether prepared by municipalities or private companies, to receive the approval of the Provincial Board of Health, and that approval was not given unless a safe supply was proposed.